

SOFTWARE ENGINEERING LABORATORY SERIES

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# SOFTWARE ENGINEERING LABORATORY (SEL)

## DATA AND INFORMATION POLICY

APRIL 1991

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LABORATORY (SEL) DATA AND INFORMATION POLICY  
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National Aeronautics and  
Space Administration

Goddard Space Flight Center  
Greenbelt, Maryland 20771

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## FOREWORD

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The Software Engineering Laboratory (SEL) is an organization sponsored by the National Aeronautics and Space Administration/Goddard Space Flight Center (NASA/GSFC) and created for the purpose of investigating the effectiveness of software engineering technologies when applied to the development of applications software. The SEL was created in 1976 and has three primary organizational members:

NASA/GSFC, Systems Development Branch

The University of Maryland, Computer Science Department

Computer Sciences Corporation, Systems Development Operation

The goals of the SEL are (1) to understand the software development process in the GSFC environment; (2) to measure the effects of various methodologies, tools, and models on this process; and (3) to identify and then to apply successful development practices. The activities, findings, and recommendations of the SEL are recorded in the Software Engineering Laboratory Series, a continuing series of reports that includes this document.

The major contributor to this document is

Frank McGarry (GSFC)

Single copies of this document can be obtained by writing to

Systems Development Branch  
Code 552  
Goddard Space Flight Center  
Greenbelt, Maryland 20771

## ABSTRACT

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This document presents the policies and overall procedures that are used in distributing and in making available products of the Software Engineering Laboratory (SEL). The products include project data and measures, project source code, reports, and software tools.

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## **SECTION 1 – BACKGROUND**

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The Software Engineering Laboratory (SEL) is responsible for carrying out advanced systems studies in software engineering for the National Aeronautics and Space Administration/Goddard Space Flight Center (NASA/GSFC). The SEL comprises three major member organizations:

1. NASA/GSFC (Systems Development Branch)
2. University of Maryland (Computer Science Department)
3. Computer Sciences Corporation (Systems Development Operation)

Each of these organizations has distinct areas of major concentration, but all are involved in each of the major efforts of the SEL. The SEL was founded in 1976 with the overall goals of performing research in evolving software engineering technologies and applying and measuring these technologies in a NASA production environment—namely, the Flight Dynamics Environment.

Over the years, the SEL has produced four major categories of resources that have become instrumental in carrying out studies and in laying the framework for future studies. These resources are discussed in Sections 1.1 through 1.4.

### **1.1 STUDIES, PAPERS, AND REPORTS**

Members of the SEL have produced several hundred publications describing all aspects of its work since its inception in 1976. The reports describe operations, data, plans, research goals, research results, etc. The SEL publishes these reports in a series of “SEL-numbered” documents (Reference 1).

### **1.2 DATA AND MEASURES**

In carrying out the studies within the SEL, over 100 flight dynamics projects have provided some level of data to the study group. The collected data are generated from four sources:

1. Forms—Data are provided by programmers and managers filling out numerous data collection forms. These forms describe project characteristics, such as effort, errors, changes, methods, and resource use.
2. Accounting information—Data from online tools provide such information as number of runs, central processing unit (CPU) time used, and source code activity.
3. Tools—Several tools are used to extract parametric data from the source code of the projects being studied. The data include such items as size, complexity, and counts on various tokens.

4. Subjective information—From interviews carried out by the researchers with members of the development teams, such information as overall project impressions and difficulties are recorded.

### **1.3 SOURCE CODE**

All of the studies conducted in the SEL utilize or produce a software product within the Flight Dynamics Division. A copy of the resultant source code, which normally is targeted for an operational mission support project, is archived in the SEL library for continued analysis.

### **1.4 SOFTWARE TOOLS AND UTILITIES**

The SEL has produced several software tools that are used to either support the analysis and archiving of data, such as the FORTRAN Static Source Code Analyzer Program (SAP), or have been generated as a result of extensive research, such as the Software Management Environment (SME). Additionally, the SEL uses several commercially available packages, such as ORACLE, to support its operations.

## SECTION 2 – DISTRIBUTION POLICY

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NASA encourages the use and distribution of study results from the SEL and has provided mechanisms for interested parties to obtain potentially useful resources produced by the SEL. In general, the SEL does not directly make available any of the reports, data, or source code, but instead has designated specific distribution organizations to handle the exporting of relevant material.

### 2.1 STUDIES, PAPERS, AND REPORTS

The SEL library maintains a current list of all reports that have been produced by SEL studies. It also maintains copies of these reports; additionally, key reports are entered in the NASA Scientific and Technical Installation Facility (NSTIF) as well as the National Technological Information Service (NTIS). If the publication is available from either NSTIF or NTIS, requests must be made to that organization.

The addresses for these organizations are:

- NSTIF  
P.O. Box 8757  
BWI Airport, Maryland 21240
- NTIS  
5285 Port Royal Road  
Springfield, Virginia 22161

NASA (through the SEL library) will provide—free of charge—single copies of the following:

- “Annotated Bibliography” containing the list of all SEL documents
- Any SEL document that is not readily available in NSTIF or in NTIS

There is no restriction or limitation on anyone reproducing SEL documents except where the document consists of papers or reports that have been included in a journal or conference where papers were copyrighted.

Documents may be obtained by contacting:

SEL Library  
Code 552  
Goddard Space Flight Center  
Greenbelt, Maryland 20771

Telephone number: (301) 286-3074



## **2.2 SEL DATA (SEL DATA BASE)**

Data are not available directly from the SEL. All requests for any information from the SEL data base are directed to the Data and Analysis Center for Software (DACS), which is located at the Rome Air Development Center (RADC) in Rome, New York. DACS handles requests for all information from the SEL data base.

Member organizations of the SEL have determined that no data or forms will be made available directly from any member organization. This is due to limited resources and is a means to assure equal access to any data or general project information.

Copies of the SEL data base may be obtained by contacting:

DACS  
RADC  
Griffiss Air Force Base  
Rome, New York 13441

Telephone number: (315) 336-0937

The updated version of the SEL data base is sent to DACS approximately once per year (Reference 2). The version that was sent in April 1991 contained 104 projects and 12 megabytes of information.

This data base contains the following types of information for each of the projects:

- Resource data—Time charges of developers and managers as well as computer time used
- Error data—Errors reported during development and testing
- Product characteristics—Source size, number of components, component information, etc.
- Estimates history—Manager's periodic estimate of size, effort, schedules, etc.
- Growth history—Weekly history of the size of completed source code (lines)
- Change history—Weekly history of number of source code changes made
- Project characteristics—Dates, sizes, staffing, reuse, etc.

It should be apparent that one must understand the environment, problem characteristics, special project constraints, events, etc., to make valid use of the raw data on the SEL data base. It is dangerous to attempt to use the project data without completely understanding the context in which the data were produced.

## **2.3 SOURCE CODE AND RELATED PROJECT INFORMATION**

The SEL will not make available any project source code or any related software products such as documentation, descriptions, or general characteristics. However, many

of the projects on which the SEL has conducted studies and/or measurement, submit the full set of source code and documentation to the Computer Software Management and Information Center (COSMIC). This organization is the only distribution facility that will make any of the project source code or documentation available.

Information as to availability and cost of the particular source code may be obtained by contacting:

COSMIC  
The University of Georgia  
382 East Broad Street  
Athens, Georgia 30602

Telephone number: (404) 542-3265

Source code from relevant projects is forwarded to COSMIC approximately 6 months after completion of the development/acceptance phase.

## **2.4 SOFTWARE TOOLS AND UTILITIES**

No software products generated by or for the SEL may be distributed directly to any requesting individual or organization. As with the distribution policy of the project source code, the only valid distributor of any relevant tools or other software products is COSMIC. The SEL library maintains a list of software products that have been produced by the SEL and that are available from COSMIC. Such information may be obtained from the SEL by contacting the SEL library.

## **GLOSSARY**

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<b>COSMIC</b>	<b>Computer Software Management and Information Center</b>
<b>CPU</b>	<b>central processing unit</b>
<b>DACS</b>	<b>Data and Analysis Center for Software</b>
<b>GSFC</b>	<b>Goddard Space Flight Center</b>
<b>NASA</b>	<b>National Aeronautics and Space Administration</b>
<b>NSTIF</b>	<b>NASA Scientific and Technical Installation Facility</b>
<b>NTIS</b>	<b>National Technological Information Service</b>
<b>RADC</b>	<b>Rome Air Development Center</b>
<b>SAP</b>	<b>FORTTRAN Static Source Code Analyzer Program</b>
<b>SEL</b>	<b>Software Engineering Laboratory</b>
<b>SME</b>	<b>Software Management Environment</b>

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## NOTES:

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